

WHAT IS CLAIMED IS:

1. An apparatus for ruggedizing and securing a touchpad assembly comprising:

5 a touchpad having spaced-apart first and second surfaces, to receive a data signal from a user and to couple said signal to a cable;

a printed circuit board assembly (PCBA) having spaced-apart first and second surfaces, said PCBA coupled to said cable to receive said data signal from said touchpad;

10 a support lens having a first surface upon which said touchpad and said PCBA are disposed;

a shield having spaced-apart first and second surfaces, said shield over-covering said touchpad, said cable, and said PCBA, and defining a through opening in said first surface overlying and permitting access to said touchpad; and

15 means for securing said shield to said PCBA to enhance at least one of water-proofing and theft-vulnerability of said apparatus.

2. The apparatus of claim 1, wherein said means for securing includes mounting said shield to said support lens.

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3. The apparatus of claim 2, wherein mounting is carried out using at least one of screws, nuts, bolts, and rivets.

4. The apparatus of claim 1, wherein said means for securing includes
25 chamber seals to seal and define a security chamber space between portions of said shield, said PCBA, and said support lens.

5. The apparatus of claim 4, wherein said chamber seals include a plurality of first chamber seals disposed between the second surface of said
30 shield and the first surface of said support lens, around a perimeter of said PCBA.

6. The apparatus of claim 5, wherein said first chamber seals comprise adhesive material.

7. The apparatus of claim 6, wherein said adhesive material comprises a gasket.

8. The apparatus of claim 5, wherein said chamber seals comprise a plurality of second chamber seals that lie between said second surface of said PCBA and said first surface of said support lens.

9. The apparatus of claim 8, wherein said second chamber seals comprise a double-sided adhesive material.

10. The apparatus of claim 9, wherein said adhesive material comprises a gasket.

11. The apparatus of claim 1, wherein said means for securing includes an anti-theft latch.

12. The apparatus of claim 11, wherein said shield defines at least one injection port through which encapsulation resin is injectable into said security chamber space;

wherein said anti-theft latch is molded into said encapsulation resin such that upon setting and curing of said resin, said PCBA is not readily disassembled from said apparatus.

13. The apparatus of claim 12, wherein a set mount of said encapsulation resin is injected into said security chamber space.

14. The apparatus of claim 11, wherein said anti-theft latch comprises a spring.

15. The apparatus of claim 11, wherein said anti-theft latch includes a metallic material.

16. The apparatus of claim 14, wherein said spring comprises an upper

portion, a central portion, and a lower portion, such that said upper portion is coupled to said second surface of said shield, said lower portion is coupled to said first surface of said PCBA, and said central portion extends from said upper portion and angles downward toward said lower portion.

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17. The apparatus of claim 11, wherein a portion of said anti-theft latch is welded to said second surface of said shield.

18. The apparatus of claim 11, wherein said anti-theft latch is electrically
10 coupled to said PCBA.

19. The apparatus of claim 11, wherein said anti-theft latch is electrically coupled to said PCBA with electrically conductive double-sided adhesive material.

20. The apparatus of claim 19, wherein said adhesive material
15 comprises a gasket.

21. The apparatus of claim 18, wherein said anti-theft latch is electrically coupled to a ground pad on said first surface of said PCBA.

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22. The apparatus of claim 1, further including a shock isolation mounting for said shield, disposed between said second surface of said shield and said first surface of the touchpad;

wherein said shock isolation mounting helps retain said touchpad to said
25 support lens.

21. The apparatus of claim 1, wherein said support lens includes optical quality transparent material.

22. The apparatus of claim 21, wherein said support lens includes at
30 least one of polycarbonate and glass.

23. The apparatus of claim 1, wherein said shield comprises a metallic

material.

24. The apparatus of claim 1, wherein said cable is a flex cable.

5 25. A method of ruggedizing and securing a touchpad assembly, the method comprising the following steps:

supporting a touchpad and a printed circuit board assembly (PCBA)
with a lens, such that the touchpad and PCBA lie on a first surface of the
lens;

10 coupling a cable between the touchpad and the PCBA;
providing a shield having spaced-apart first and second surfaces to
cover said touchpad, cable, and PCBA, said shield defining an opening sized to
permit accessing said touchpad; and
providing at least one of a water-proofing enhancement mechanism
15 and an anti-theft mechanism, to secure said shield to said PCBA.

26. The method of claim 25, wherein said shield is mounted to said
support lens.

20 27. The method of claim 25, further including defining a sealable security
chamber space between portions of said shield, said PCBA, and said support
lens, and sealing said space with at least one chamber seal.

28. The method of claim 27, further including sealing a second surface
25 of said shield and a first surface of said support lens around a perimeter of said
PCBA using at least one chamber seal disposed between said second surface of
said shield and said first surface of said support lens.

29. The method of claim 27, further including sealing a second surface
30 of the PCBA and a first surface of the support lens using at least one second
chamber seal disposed between said second surface of said PCBA and said first
surface of said support lens.

30. The method of claim 25, further including injecting encapsulation resin through an injection port, defined in said shield, into a security chamber space, such that said anti-theft latch is molded into said encapsulation resin and such that upon setting and curing of said resin, said PCBA cannot readily be
5 disassembled.

31. The method of claim 30, further including injecting a set amount of encapsulation.

10 32. The method of claim 25, further including welding a metallic spring to said shield and to said latch.

15 33. The method of claim 25, further including electrically coupling said anti-theft latch to said PCBA.

34. The method of claim 33, wherein the step of securing further comprises electrically coupling the anti-theft latch to the PCBA by contact with a ground pad on the first surface of the PCBA.

20 35. The method of claim 25, further including providing a shock isolation mount to retain said touchpad to said support lens, said mount being disposed between a second surface of said shield and a first surface of said touchpad.

25 36. A method for water sealing a cable opening of a touchpad assembly, the method comprising:

adding double-sided adhesive tape to a first surface of a support lens between a cable opening in the support lens and a touchpad;

30 attaching a cable to the touchpad, such that the cable lies on the double-sided tape as the cable runs from the touchpad through the opening, and such that the tape acts as a sealant under the cable; and

placing top adhesive tape over the double-sided tape, a portion of the cable, and the entire cable opening in the support lens in order to seal the overall cable opening.

37. The method of claim 33, wherein the step of adding tape includes providing a flex cable.

5 38. The method of claim 36, wherein the step of placing top adhesive tape includes using at least strip of tape.

39. The method of claim 36, wherein the step of placing top adhesive tape includes covering a length of said cable extending from said touchpad to said
10 cable opening.

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